A Comparative Study of Instructors' Marks Received by Letter and Non-Letter Men in College

by

Maurice Bennett Myer
B.S. in Education
Kansas State Teachers' College
of Emporia
1924

Submitted to the Department of Education and the Faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Arts in Education.

Approved by:

J. W. Twente
Instructor in charge

Raymond A. Schwegler
Dean of the School of Education

March 1931
Date

Acknowledgments

To J. W. Twente, Professor of Education, University of Kansas, for his advice, supervision, and encouragement, the writer is under deep obligation. To H. E. Schrammel, Director of the Bureau of Tests and Measurements of the Kansas State Teachers' College of Emporia, for his cooperation in securing data that made this thesis possible and for his interest in solving complications that arose, the author expresses gratitude. To Myrtle Ruth Myer for the drive that made the writing of the thesis a pleasure, the author's thanks.

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CHAPTER I

Introduction

One of the things about which a great controversy has raged in recent years has been the growth of athletics in secondary schools and colleges with the difficulties which have attended this growth. Proselyting for athletics; subsidies granted athletes; huge stadiums whose overwhelming debt has made winning teams necessary-- these are but a few of the problems that cry for solution.

Among educators some of the pressing problems have been: Do men and boys who excel in athletics also excel in grades? Do athletes show inferior mental test scores? Do athletes enjoy "educational guidance" which permits them to make passing marks? In other words, do athletes choose snap courses? Are athletes favored or discriminated against by instructors? Do athletes achieve more or less in proportion to their mental ability than do non-athletes? Are athletes lower in mental ability than other college students? These are a few of the questions that men in educational research are attempting to answer.

An effort will be made in the following pages to answer for a certain restricted group of students three of these questions listed above. In this study a comparison will be made of the grades received by a group of major letter athletes, and a like number of non-letter college students. These groups will be equated on a basis of sex, school, classification, mental ability, and age.

Previous Investigations of This and Related Problems

One of the most interesting studies is that of Nofman I. Reist[1]. He investigated the teachers' marks of athletes on the first squads of four northeast Kansas high schools and an equated group of non-athletic boys. He found that the athletes' mean grade exceeded that of the non-athletes in all four schools. The reliability of the difference between the two means showed that the athletes would surpass the non-athletes in 96 out of 100 cases. Further investigation of the correlation of athletes' mean grades with I.Q.

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1. Numbers refer to references at end of thesis on page 36, Chapter V.

and non-athletes' mean grades with I.Q. showed that in three out of the four schools the athletes surpassed the non-athletes in positive correlation. In the fourth, the non-athletes had the higher correlation between I.Q. and average grades.

The athletes as a whole had a correlation of .401- .05, while the non-athletes' was .34- .06. These figures are so low and the difference so small that there is some question as to their significance. The author suggests that this apparent difference may be a prejudice on the part of instructors in favor of the high school athlete.

Paul Anderson[2] studied 154 Indiana basketball players who were certified as eligible for the state tournament and a group of boys who were not participants in inter-school sports. He showed that the athletes had a mean I.Q. (Terman Group Intelligence Test) of 96.19± .56, while the non-athletes had a mean of 97.13± .55.

Since the difference between the means was .94 and the PE was .78, this cannot be regarded as of great significance. He concludes that high school athletes in Indiana do not vary from

an otherwise unselected group.

However, he found the mean semester grades for the athletes to be 84.53, while for the non-athletes it was but 83.72. This difference of .81 in favor of the athletes has a PE of .34 and hence he says the chances are 94 out of 100 that the athletes will surpass in grades. On the other hand, hs found the median for the athletes was 84.95 while for the non-athletes it was 85.15. This leaves a question as to the validity of the statistical assumption that in 94 times out of 100 the athletes will be superior.

Anderson did not mention that the difference might be accounted for by the fact that in Indiana participants are required to make passing grades in three subjects. Non-athletes are under no such stimulus.

His study showed a slightly significant statistical advantage in favor of the athletes in the correlation between I.Q. and semester grades. The r (Pearson) of the athletes' I.Q.'s and semester marks was .54± .021 while that of the non-athletes was .468± .022.

A study more related to the present inves-

tigation is that of Professor Donald Snedden[3] concerning the scholarship of athletes and non-athletes of the class of 1927 at Harvard University. His study was a part of the 1928 survey of the Carnegie Foundation for the Advancement of Teaching.

He found that there was no significant difference between athletes and non-athletes in the following respects: times on probation; average number of courses carried per semester; hard versus easy courses taken. As to graduation, the chances were in favor of the athletes. Athletes remained in school for an average of 7.37 semesters as against 6.55 for the non-athletes.

On the other hand, Snedden found a highly significant difference in favor of the non-athletes so far as grades were concerned. With a marking system of highest grade, 5; next, 4; on down to F, equalling 1, the athletes had a mark of 3.15 as compared with 3.27 for the non-athletes.

"Generally speaking," Professor Snedden concludes, "we find in this sample, that the athletes stay in school longer, graduate more of their number, and do so in less time than do the non-athletes. On the other hand the non-athletes

tend to obtain slightly higher grades. ----we have no way of knowing that such differences as we do find are, or are not, caused by athletics. We have only determined that there are certain relationships."

Coach Herbert McCracken[4] of Lafayette College investigated the standing of captains of athletic teams of 47 Eastern and Mid-Western colleges and universities and compared them with leaders in non-athletic activities. He also compared their grades with those of the student body in general. The following table shows the results of this study:

Table I

Comparison of Scholastic Standing of Athletic Captains and Non-athletic Leaders with General Scholastic Standing of Students in 47 Colleges

Athletic Captains	Below Average	Average	Above Average	Honor Group	Total
Football	7	7	23	2	39
Basketball	14	6	15	4	39
Baseball	10	9	16	1	36
Track	13	4	14	7	38
All Athletes	44	26	68	14	152
Non-athletic Leaders	28	22	69	39	158

The headline from which this study was taken

read, "College Athletes Above Average in Scholarship", and is very misleading. It should have read "Athletic Captains Slightly Below Other College Leaders in Scholarship". The study shows that captains of athletic teams are above the run of college students in scholarship.

Burtt and Nichols[5] carried on an investigation at Ohio State in which a comparison was made of the university athletes with other classmen, as well as of one group of athletes with another. Groups I, II, III, IV, and V were determined on a percentile basis. Athletes were those who played on a university squad. The mental test was one derived from the Army Alpha. In general it was found that all athletes ranked slightly lower than the average of the university class men. The table of results will be found below:

Table II[a]

Comparison of the Average Intelligence Standing of the Various Groups of Athletes, One with Another and with the Average of the University

Groups	High I-II	Average III	Low IV-V
University	40%	45%	15%
Cross Country	50%	50%	0%
Tennis	25%	67%	8%
Golf	14%	86%	0%
Track	46%	44%	10%
Baseball	32%	48%	20%
Basketball	35%	40%	25%
Football	24%	53%	23%
Wrestling	25%	44%	32%
All Athletes	32%	51%	17%

In 1923 Paul Rhoton[6] studied the effect that athletic participation has upon college students' scholarship. First string university athletes were considered as athletes. Records of 931 men were utilized and instructors' semester grades constituted the scholarship record. The plan used was to average the grades made by athletes during semesters of participation and then compare them with grades made during

(a) Burtt, H. E., and Nichols, J.H., Op. Cit. pp. 126-28

semesters of non-participation as well as with the average grades made by non-athletes.

The findings for the first comparison are given in Table III. It will be noted that in those sports in which there is a heavy physical drain there was a corresponding loss in grades. This applied to football, track and cross-country, and basketball. On the other hand, some sports actually seemed to increase the grades earned during the semesters in which athletes participated. Soccer, wrestling, lacrosse are apparently in this class. It must be noted, however, that the number of cases on which these findings are based was very small and hence open to a large PE. They are not very reliable statistically.

Table III [a]

Comparison of the Average Scholastic Standings of Athletes of Various Sports during Semesters of Participation with Standings during Semesters Not Participating and with Standings made during All Semesters.

Groups	All semesters	Semesters participating	Semesters not participating	No. of Athletes
Football	73.5	72.4	74.4	34
Baseball	74.8	74.6	74.9	21
Track	74.5	73.7	75.6	16
Basketball	75.0	73.9	76.5	13
Soccer	76.8	77.0	76.7	10
Wrestling	77.4	78.3	76.9	10
Lacrosse	76.4	79.4	74.9	15
Boxing	76.6	76.9	76.6	7
Tennis	74.6	74.6	74.6	5
Cross Country	76.5	74.9	78.6	5
Average		75.0	75.5	

(a) P. Rhoton, Op. Cit.

D. A. Worcester[7] made a study of the effect of outside work and athletic participation upon scholarship at the Kansas State Teachers' College of Emporia. His study seemed to show that those men who do outside work enroll in more hours, and receive higher grades than those men who do not engage in outside work. Furthermore, those athletes who carried outside work made higher grades than those who engaged in athletics only. They also made higher grades than those who did not engage in athletics, or in outside work. Some have said(a) that "This showed clearly that outside work and athletic participation do not affect the scholastic standing of students".

Such a conclusion does not necessarily follow. Indeed, it may as well be concluded that students with the stronger mentality engage in athletics or outside work. We do not know how much better those students' grades would have been had they not engaged in athletics or outside work. Furthermore, they may have had the advantage of "educational" guidance from some one in the athletic

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(a) Reist, Norman I. "A Comparative Study in Terms of Teachers' Marks", p. 5.

department to enable them to take courses in which it was fairly certain that they would pass.

In the highschool field, Robert Taylor Hall[8] has made one of the most complete investigations available. Fifty-four boy athletes from various Colorado highschools were paired with fifty-four chance non-athletes. The average age of the athletes was found to be 211 months as against 205 for the non-athletes. The mental score (weighted mean of 5-battery intelligence test) of the athletes was found to be 138 for the athletes and 153 for the non-athletes. The achievement score was found to be 111 for the athletes and 124 for the non-athletes in the Iowa high school content examination. The implications of the conclusions are so interesting that one wishes that the author had used more than fifty-four athletes so that the study might have been statistically more reliable. Nevertheless, the study will be considered valuable for this present study.

Summary of Previous Investigations

1. In high schools Norman Reist's study shows that athletes achieve more in grades according to intelligence quotients than do non-athletes.

He compared a group of athletes and non-athletes after equating them on the basis of sex, age, school, and I.Q.(Terman).

2. Anderson and Hall showed that athletes had a lower I.Q. and mental score than did an unselected group of non-athletic boys from the same schools. Anderson's figures were 96 I.Q. for the athletes and 97 for the non-athletes. Athletes in Anderson's study and in Reist's study made higher grades, absolutely, than the non-athletes, while in Hall's carefully conducted study of achievement, the athletes achieve less.

3. In Snedden's study of Harvard athletes, it was shown that athletes make lower grades, but tend to stay in school longer, and are more certain to be graduated.

4. McCracken showed that athletic leaders make lower grades than leaders in other extra-curricular activities in college.

5. Burtt and Nichols showed that there are significant differences between different sports and the men that engage in them, track and cross country athletes being definitely superior to others. As a whole, athletes ranked lower than

the rest of the students of the university.

6. Other investigations in high school show, according to the authors, that in eastern Kansas, high school athletes receive higher grades than non-athletes, and also achieve more in proportion to their mental ability. On the other hand, Hall seemed to prove that high school athletes have a lower mental ability as measured by present mental tests but also achieve less, not only on a basis of actual achievement, but also on a basis of achievement in comparison with mental ability.

CHAPTER II

A. General Problem

It is the purpose of this investigation to determine whether college athletes have a higher or lower intelligence test score than the rest of the men students. Furthermore, do they receive better or poorer grades than do other non-athletic students in the same college?

Attempts have been made in isolated cases by various means to discover whether or not athletic competition is a specific factor in determining scholastic behavior. Many educators (as well those not engaged in educational work) have felt that being an athlete either made one or damned one so far as scholarship is concerned.

The idea that one's mental ability is affected by the length of his nose, the shape of his ears, or the contour of his head has gradually disappeared since Lombroso's time, but the belief continues that the thing that causes an athletic reaction in an individual may in some way cause the athlete to make a poor mental score or poor achievement in grades; others contend that this same thing causes a better mental score, or better grades.

B. Specific Problems of This Study

This study will attempt to answer the following questions regarding 99 major-letter athletes from the Kansas State Teachers' College of Emporia:

1. Do these major-letter men rank higher or lower than the other men of the student body in mental test results?
2. Does this group of major-letter men receive higher or lower grades than other men of equal mental test scores?
3. Do these men, in proportion to their mental test scores, receive higher or lower grades than non-athletes?

CHAPTER III

Terms Defined

It should be noted here that it is to be doubted whether "athleticity" (if one may use that term) is a whole or none condition. That is, it is not a thing which one has or has not, as, for instance, sex. One is born a female or a male. But one is not born an athlete. Some may have quicker muscular reaction than others but everyone has a certain degree of muscular reaction in order to fit into his environment. Therefore all students who attack this problem are beset at the outset with a definition of the term athlete. Reist[1] called first string players athletes. Anderson[2] called those boys on the eligibility list athletes. Snedden[3] called anyone an athlete who was on a first squad. Taylor[8] defined an athlete as anyone who was on a first squad for competitive purposes or received an "A" grade in gymnastic work.

All of these definitions are arbitrary. The author has avoided this difficulty by using the term letter man instead of athlete. This usage, he is aware, may be attacked on the ground that

it eliminates many students who are athletic but who, for some reason, fail to earn a letter. The defence is based on two grounds. First, it is no more arbitrary than the other definitions used in previous investigations. Secondly, it has the merit of convenience. The names of letter men were available for the years desired for this investigation while those of squad members were not. In this investigation the term athlete will refer to major letter men.

Whenever the terms mentality, mental ability, or similar words are used, they will refer to scores made on mental tests which will be described more in detail later. The writer is well aware that this usage is open to condemnation but the practice is common and at our present status of education the most accurate thing that one can say as to an individual's mentality or intelligence is that he made a score of a certain number of points upon a certain test. This leaves the reader to decide for himself whether deductions made on the basis of this score are valid. All references to intelligence or mental ability will refer to scores made on tests will be described more fully on page 36.

Methods Used

Two methods are open for the attack of this problem. One may take a group of students and designate it as the athletic group because of certain characteristics and may compare these students with certain other groups or the student body as a whole as to mental ability, grades and other achievements.

The other method available is that of equated groups. The major letter group which we wish to study has individuals in it of certain sex, age, mental test score, and classification. For each major letter man we find a non-letter man who matches the athlete as to age, mental test score, sex, and classification. The two groups are then equal in all important variables except athleticity. We may then compare the mean grades of the two groups and see which is the higher.

This method does away with the statistical calculation necessary in holding several variables constant, but it has the difficulty of equation; i.e., it is impossible to equate completely the two groups, especially when several variables must be taken into consideration.

The equated groups method was adopted for this study. Names of major letter men at the Kansas State Teachers' College of Emporia for the calendar years 1924-1928 inclusive were obtained from the secretary of the athletic committee. These 110 major letter men were then matched individually with non-letter men as to age, mental test scores, classification, and school. There were 110 pairs of names, each pair being alike as to age, mental test score, and classification, the only difference being that half of them were not letter men.

The grades of the two groups were then arranged on a numerical basis for all the years for which there was a record at the registrar's office. The following method was used to reduce the grades to a numerical basis[a] F-1, D-5, C-7, B-9, and A-13. Each individual's grades for the time he was in school were then averaged, weighted on a basis of hours represented in each grade. The mean for each group was also computed.

The correlation between the control groups' sigma intelligence score and the grade score was computed and compared with the r (Pearson) of the athletes'.

(a) Wood, Ben. "Measurement in Higher Education".

Presentation of Data

Table IV

Data on Major-letter Athletes

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
1	122		47	6.78	19
2	165		63	7.90	19
3	145		55	7.70	20
4	119		46	8.58	22
5	Data imcomplete				
6	146		55	5.95	17
7	163		62	9.19	19
8	88		35	5.66	20
9	119		46	6.37	19
10	113		44	5.00	20
11	92		36	6.11	19
12	127		49	6.00	21
13	121		47	6.72	19
14	118		46	6.52	18
15	99		39	5.21	21
16	97		38	7.11	17
17	97		38	6.88	24
18	Data incomplete				

Table IV (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
19	139		58	6.46	19
20	88		35	6.34	19
21	118		54	7.66	19
22	147		56	9.28	25
23		51	43	5.13	19
24	150		57	6.24	19
25	89		35	5.18	21
26	131		50	7.08	18
27	Data incomplete				
28		81	57	6 .33	18
29	118		46	5.21	23
30	Data incomplete				
31	65		27	5.10	20
32	70		28	5.27	19
33	107		42	8.29	20
34	108		42	5.28	18
35		59	46	4.65	18
36	92		36	5.72	20
37	137		52	7.98	19
38	87		34	2.44	20
39		58	46	3.51	21

Table IV (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
40	Data incomplete				
41	159		60	8.23	19
42		85	55	6.10	18
43	92		35	6.90	19
44	92		35	7.42	17
45	131		50	8.21	18
46		60	46	4.31	19
47	105		41	6.85	19
48	118		46	6.85	22
49		46	41	6.48	18
50	137		52	5.24	20
51	141		54	5.82	18
52	Data incomplete				
53	94		37	7.30	21
54	107		42	7.11	19
55	Data incomplete				
56	65		27	4.66	18
57	128		49	6.93	19
58	161		61	7.11	17
59	109		42	6.05	19
60	Data incomplete				
61	109		42	7.25	20

Table IV (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
62	128		49	6.72	21
63		58	45	6.00	18
64	137		52	8.95	20
65	116		45	7.67	20
66	85		34	6.69	21
67	87		35	6.09	21
68	138		53	8.05	24
69	93		37	7.77	18
70	86		34	5.83	20
71		44	40	7.00	19
72	128		49	5.96	17
73	79		32	6.28	19
74	74		30	7.75	19
75		65	48	5.48	19
76	178		67	10.52	21
77	152		58	8.07	19
78		48	41	4.51	20
79	124		48	7.73	17
80		51	43	5.60	17
81	112		43	5.82	22
82	119		46	7.88	19
83	128		49	5.60	20

Table IV (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
84	142		54	8.47	25
85		20	30	6.04	19
86		65	48	5.07	17
87	142		64	7.37	20
88	154		59	5.42	19
89	128		49	8.45	22
90	168		63	9.99	19
91	143		54	7.44	19
92	77		31	6.19	21
93	Data incomplete				
94	95		38	5.07	19
95	74		30	5.63	21
96	102		40	7.59	18
97	Data incomplete				
98	90		36	7.10	20
99	146		55	7.93	21
100	172		65	7.77	21
101	113		44	6.66	19
102	Data incomplete				

Table IV (concluded)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
103	159	[illegible]	60	8.86	18
104	129	-----	50	6.69	22
105	95	-----	32	6.88	19
106	167	-----	63	6.61	21
107	119	-----	46	7.00	18
108	92	-----	36	6.69	25
109	78	-----	31	6.12	19
110	123	-----	42	5.95	20

Table V

Data on Non-Athletes

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
1	122		47	6.24	18
2	158		59	7.02	17
3	143		55	9.06	21
4	119		46	5.39	22
5	No athlete				
6	143		55	7.09	21
7	163		62	7.17	18
8	85		34	5.75	23
9	119		46	5.71	21
10	113		44	7.47	22
11	87		35	6.37	19
12	129		49	6.92	20
13	121		47	5.33	20
14	114		45	6.83	19
15	99		39	5.06	19
16	97		38	4.83	19
17	99		39	6.24	19
18	No athlete				
19	139		53	3.66	18
20	90		35	5.55	18

Table V (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
21	119		46	7.10	22
22	147		56	5.91	28
23		51	43	6.85	18
24	157		60	7.95	18
25	86		34	4.76	18
26	131		50	5.77	23
27	No athlete				
28	150		57	5.96	21
29	117		45	6.77	20
30	No athlete				
31	77		31	7.05	20
32	73		30	8.62	24
33	116		45	7.75	23
34	135		52	6.78	18
35		52	43	6.91	20
36	97		38	6.53	18
37	140		53	7.27	18
38	87		35	1.00	23
39	103		40	3.41	19
40	No athlete				

Table V (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
41	158		60	6.97	18
42		82	57	6.53	17
43	91		36	7.00	19
44	94		37	4.62	21
45	138		53	5.78	16
46	120		47	6.11	19
47	106		41	7.21	23
48	117		45	3.82	19
49	105		41	1.00	19
50	139		53	6.59	20
51	142		54	7.60	19
52	No athlete				
53	94		37	2.23	20
54	112		43	6.62	18
55	No athlete				
56	73		30	4.94	18
57	132		51	8.73	28
58	159		60	5.76	19
59	108		42	7.43	17
60	No athlete				

Table V (continued)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
61	110		43	7.59	21
62	128		49	6.31	21
63	117		45	2.09	20
64	141		54	8.32	17
65	115		45	7.53	17
66	85		34	6.47	19
67	90		35	6.98	19
68	140		53	6.72	17
69	93		36	4.68	18
70	85		34	3.57	19
71		44	40	6.11	19
72	119		46	9.28	19
73	78		32	2.77	20
74	75		31	1.00	21
75		59	46	5.08	20
76	182		68	11.08	30
77	152		58	8.37	21
78		31	37	3.91	21
79	118		46	5.89	20
80		56	45	5.08	21

Table V (continued)

No.	Army Alpha Test Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
81	118		46	7.07	25
82	119		47	8.27	19
83	125		48	5.17	21
84	142		54	6.71	19
85		20	30	7.00	21
86		70	50	6.52	18
87	142		54	3.87	19
88	154		58	6.53	18
89	125		47	5.61	19
90	174		65	9.43	19
91	137		52	6.68	19
92	83		33	4.92	25
93	No athlete				
94	107		42	8.25	19
95	76		31	5.53	24
96	103		40	6.78	20
97	No athlete				
98	83		33	7.11	20
99	141		54	7.61	23
100	172		65	6.31	18

Table V (concluded)

No.	Army Alpha Score	K.S.T.C. Score	Sigma Intelligence Score	Weighted Mean Grade	Age When Test Was Taken
101	113	-----	44	8.13	20
102	No athlete				
103	148	-----	56	9.53	18
104	129	-----	50	4.07	19
105	96	-----	38	6.06	21
106	167	-----	63	8.91	22
107	112	-----	43	5.67	24
108	93	-----	37	4.00	18
109	70	-----	29	6.83	21
110	111	-----	43	5.30	20

Table VI

Correlation between Grades and Mental Test Scores of Athletes

Mental Test Score / Grades	25-29.9	30-34.9	35-39.9	40-44.9	45-49.9	50-54.9	55-59.9	60-64.9	65-69.9
11-11.99									
10-10.99									1
9- 9.99							1	2	
8- 8.99				1	2	4	2	2	
7- 7.99		1	5	4	5	4	1	3	1
6- 6.99		6	6	4	8	1	4	1	
5- 5.99	2	2	5	6	5	2	2		
4- 4.99	1			1	2				
3- 3.99				1					
2- 2.99		1							
1- 1.99									

$r = .433 \pm .054$

Table VII

Correlation between Grades and Mental Test Scores of Non-athletes

Mental Test Score / Grades	25-29.9	30-34.9	35-39.9	40-44.9	45-49.9	50-54.9	55-59.9	60-64.9	65.69.9
11-11.99									1
10-10.99									
9- 9.99					1		2		1
8- 8.99		1		2	1	2	1	1	
7- 7.99		3	1	4	4	3	2	2	
6- 6.99	1	1	5	5	6	6	2	1	1
5- 5.99		2	2	2	8	2		1	
4- 4.99		3	4		1	2			
3- 3.99		1	1	1	1	1			
2- 2.99		1	1						
1- 1.99		1	1	1					

$r = .421 \pm .054$

Table VI on page 33 and Table VII on page 34 show in one form the relationship between the mean grades of each group and their mental scores. The summary for the computation shows:

	r (Pearson)
Athletes -------	.4333 ± .054
Non-athletes ---	.421 ± .054

This correlation is low and, according to McCall, the difference between the r's is insignificant in view of the standard error. One explanation is to be found in the fact that in order to be a letter man one cannot make grades below 5.000 or 4.200 or he is automatically out of the athletic group, no matter how much he may have competed on the team. If it were not for this situation the athletes would have a higher r.

The scattergram shows this clearly. Note how the athletes' group is cut off below the 4.00 line. On the other hand, three of the non-athletic group failed in every hour taken in college, while five others had a grade average below 4.000.

Interpretation of Tables IV and V

Intelligence

With only sixteen exceptions the scores on intelligence were made in the freshman year. Previous to 1927 the Army Alpha was given alone. After 1927 a special K.S.T.C. Entrance test was given, composed of the mose difficult parts of the Army Alpha and Terman Group intelligence test. In order to make these scores comparable, they were translated into sigma intelligence scores.

The Entrance sigma scale was built up on the mean and mean deviation of all first year men entering school in 1928. The Army Alpha sigma scale for transmuting Alpha scores into sigma scores was built up from the scores made by first year men in 1927. The sigma scores were then directly comparable. (See page 48, Appendix.)

On this basis the grouped sigma intelligence scores of both athletes and non-athletes were used to find the following data:

	No. of Cases	Mean	Sigma of Distribution	Sigma of Av.
Athletes	99	45.84	9.465	.951
Non-athletes	99	46.14	9.342	.939

Actual difference between the means is .30 ± 1.336. In order to have any significance the difference between the means would have to be equal to its standard error, 1.336. Since it is only one-fourth as great, we may accept the equivalence of the mental scores of the two groups. Furthermore, the standard errors of the two distributions are roughly the same. Statistically, the non-athletes would be found superior 57 times out of 100, which is lettle better than chance.(a)

The next step was to group and total the mean grades of each group and compare them in the formula: $\sigma(\text{diff}) = \sqrt{\sigma(\text{av } 1)^2 + \sigma(\text{av } 2)^2}$.

Grades

The results of the study of the mean grades are shown in the following table:

Summary of Comparison between Mean Grades of Athletes and Non-athletes

	No. of Cases	Mean Grade	Sigma of Distribution	Sigma of Average
Athletes	99	6.681	1.305	.017
Non-athletes	99	6.218	1.612	.016
Mean Grade Difference		.463 ± .1825		

(a) Garrett, "Statistics in Psychology and Education", page 130.

The results of this computation may be interpreted to mean[a] that the statistical chances are that if a similar study were made, in 99 out of 100 cases the athletes would be found to be superior in grades.

It should be noted in this connection that under our definition one must have won a major letter, which in this situation means that he must have passed successfully in twelve hours of work for the semester in which he competed. Just how much this acts as a prod to athletic competitors would be difficult to say. By definition, however, several competitors in athletics who failed to make the requisite number of hours for a letter were excluded. Thus while the lowest grade an athlete could make and be granted a letter would be 5.000 (twelve hours of D's) or 4.200 (twelve hours of D's and three hours of F's), there is nothing to prevent one of the non-athletic group from failing in all his work and still being included in the equated group. Several did so fail.

(a) Garrett, "Statistics in Psychology and Education", page 130.

How much bias this leaves in the investigation is a matter of speculation.

Age

At the outset it was said that the groups were to be equated as to school, classification, sex, mental test score, and age. As to age, unexpected difficulty was experienced. It was impossible to equate on a basis of age. Hall(a) found high school athletes to be older than non-athletes. This investigation found the athletes to be younger. The following summary shows the findings of the athletes ans non-athletes grouped on a basis of age.

	No. of Cases	Mean Age	Sigma of Dist.	Sigma of Average
Athletes --------	99 ---	20.22	-1.764 --	.177
Noh-athletes ----	99 ---	20.44	-2.424 --	.243

The mean age difference is .22 - .304, which means that statistically 91 times out of 100 the athletes would be younger than a similar group of non-athletes. This situation resulted in spite of a direct effort to equate the groups a basis of age. If no effort were made to equate the groups on this bas, the difference in favor of the athletes would be still greater.

(a) Hall, Robert Taylor. See reference No.8, p.

It is only reasonable to expect the athletes to be younger, for the peak of physical perfection and its decline is more readily ascertainable in competitive athletics than in mental competition. It was thought more important to get the two groups equated on a basis of mental test scores than age, important as the factor of age is.

Intelligence Test Scores of Athletes Compared with Those of All the Men of School

One of the most interesting problems on which this study throws some light is the question: "Are athletes lower or higher in mental test score rank than other men who do not participate in athletics?" As was explained above, since two intelligence tests were used in rating the athletes over the period 1924-29, some means of reducing them to a common score was necessary. A sigma scale was constructed for this purpose. (See exhibit number 1 in Appendix.) Thus both K.S.T.C. Entrance test scores and Army Alpha scores were reduced to one term-- the distance that that test score ranged above or below the mean in terms of standard deviation. Of course the mean for each test in sigma score would be 50. Now the base on which this sigma scale was prepared included all the men in the freshman class for 1928 for

for the Entrance test, and all the men of the freshman class of 1927 for the Army Alpha, 175 men for 1928, and 140 for 1927. (See exhibits II and III in Appendix.)

Yet on this sigma scale base the athletes, instead of averaging 50, as they should do if they were of the same mental ability as the two classes which formed the base, averaged only 45.84 or .416 sigma below the average of all the first year men of 1927 and 1928.

This difference is augmented when we recall that athletes were included in the average sigma scale of 50, and non-athletes would average above 50 almost in proportion as the athletes have a mean below it.

We must conclude, therefore, that the athletes are lower in intelligence test score than are non-athletic men. Whether their mental ability is lower or whether they do not try so hard to excel in intelligence test is a question beyond the confines of the present study. The fact remains that they are appreciably lower in the sigma scale ranking than the average of all men including athletes. For the athletes the score is 45.84, while for all men, including athletes, it is 50.00.

CHAPTER IV

Summary

The writer is now in a position to state that so far as 99 major letter men from the Kansas State Teachers' College of Emporia are concerned, the questions on page 16 may be answered as follows:

1. Major letter athletes studied here rank .4 sigma lower than the first year men of 1927-28 and 1928-29. The major letter men made a mean sigma score of 45.84 while the mean sigma score of the first year men was 50.00.(a) In other words, the athletes ranked 17 pre cent lower in mental test score than did the entering first year men.

2. The 99 major letter men made grades for the time they were in school significantly higher than did the equated group. The exact figures were a mean grade of 6.681 for the athletes, and 6.218 for the non-athletes. So far as chance error is concerned, this would indicate that the athletes would surpass in 99 times out of 100.

(a) McCall, William. "How To Measure in Education". Chapter 10.

3. So far as achievement in proportion to ability is concerned, correlation between the mental test sigma scores of the athletes compared with a similar correlation for non-athletes shows no significant difference in favor of either group. Such correlations are not as pertinent as they might be because of the fact that in order to be a major letter athlete a student must make a minimum grade of at least D in twelve hours of work, while no such prod exists for the non-athlete.

4. Previous investigations have shown that in high school, athletes are older than non-athletes. In this study the major letter men are shown to be younger than the non-athletes, despite a conscious effort to equate the groups on the basis of chronological age.

Conclusions

The writer of this thesis is of the opinion that athleticity is not a whole or none condition, as some authors take for granted. Like long noses, or variation in

sizes of feet, it may be found in the moron as well as the genius. The author is brought to the final conclusion that in this particular case the athletes did receive higher grades than did non-athletes of the same apparent mental caliber. Whether this is due to the stimulus of having to pass in twelve hours of work, or is due to the unconscious bias on the part of instructors for athletes, or is due to "educational guidance" or choice of "snap" courses, cannot be answered in this study.

Recommendations

The author has pointed out that the control group could not be equated on a basis of age. This should have been done. The mental score which was used was faulty because it was dependent upon one test alone, and the number of athletes available for study may not have been enough to compensate for chance variation of one mental test.

This study took only major letter winners for the calendar years 1924-28 inclusive. This meant that seniors in 1924 were counted if they won a letter in track of basketball. Freshmen entering in 1924 might win twelve letters altogether but

would be given no more weight than a man who had but one. An interesting study would be that of correlating the athletes' mental test scores with their grades, and with their "athleticity" or number of letters earned. Would the mental score go up, go down, or remain the same, as the number of letters increased?

A series of studies using a similar or improved technique for many colleges would be valuable.

CHAPTER V

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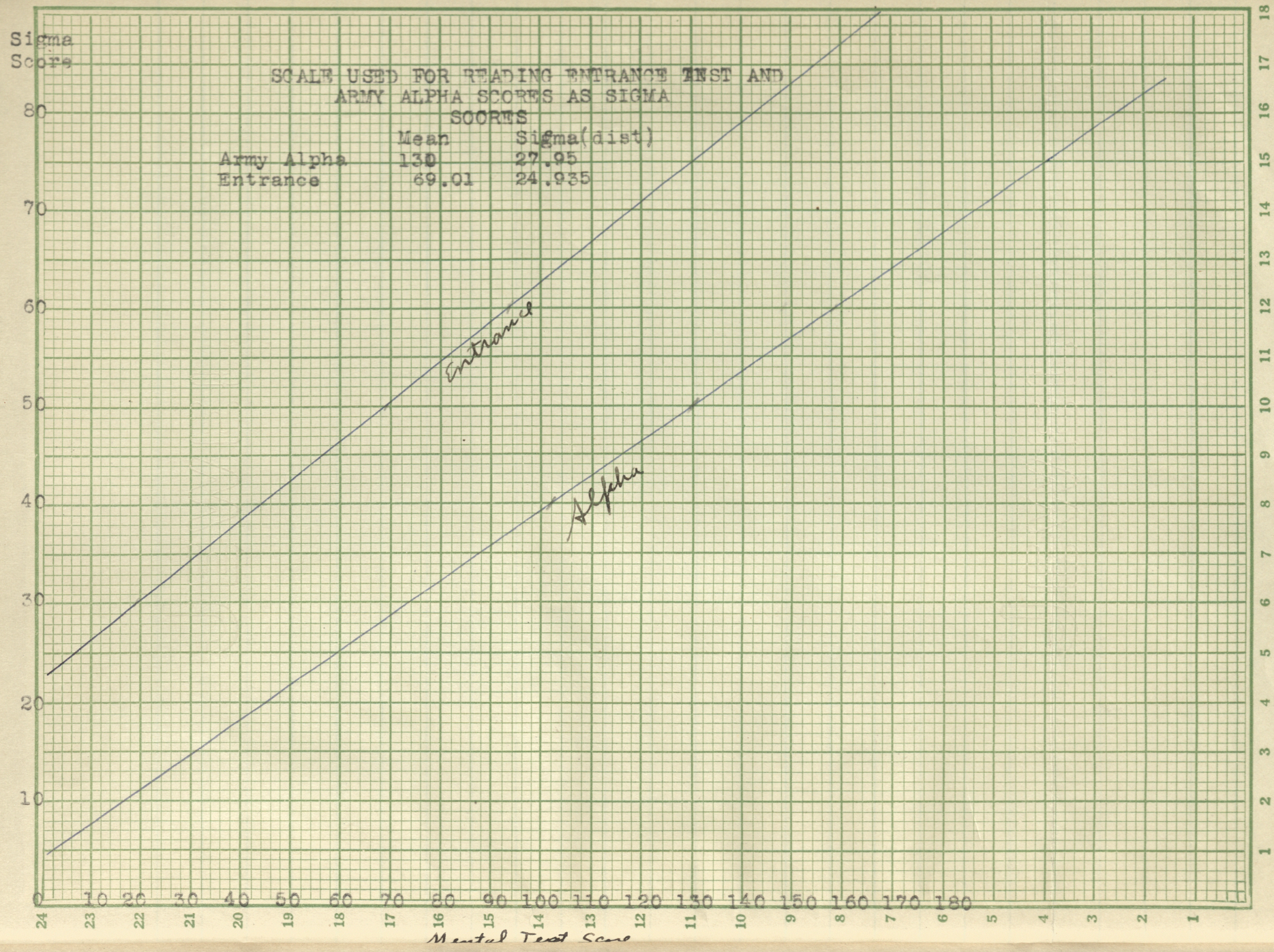
APPENDIX


Sigma Score
SCALE USED FOR READING ENTRANCE TEST AND ARMY ALPHA SCORES AS SIGMA SCORES
Mean
Sigma(dist)
Army Alpha 130 27.95
Entrance 69.01 24.935
Entrance
Alpha
Mental Test Score

Appendix

Scores Made by First-Year Men at the Kansas State Teachers' College of Emporia on Intelligence Tests

Army Alpha (1927-28)

Score	Frequency
195-199.9	1
190-194.9	1
185-189.9	1
180-184.9	2
175-17919	3
170-174.9	3
165-169.9	7
160-164.9	3
155-159.9	7
150-154.9	5
145-149.9	6
140-144.9	12
135-13919	10
130-134.9	10
125-129.9	9
120-124.9	9
115-119.9	9
110-114.9	11
105-109.9	7
100-104.9	4
95- 99.9	3
90- 94.9	5
85- 89.9	5
80- 84.9	2
75- 79.9	1
70- 74.9	2
65- 69.9	1
60- 64.9	0
55- 59.9	0
50- 54.9	1

Total --------140
Mean ---------130.15
S.D. --------- 27.95

Scores Made by First Year Men at the Kansas State Teachers' College of Emporia on Intelligence Tests

(concluded)

K.S.T.C. Entrance (1928-1929)

Score	Frequency
120-124.9	2
115-119.9	5
110-114.9	3
105-109.9	6
100-104.9	3
95- 99.9	12
90- 94.9	4
85- 89.9	9
80- 84.9	11
75- 79.9	9
70- 74.9	16
65- 69.9	19
60- 64.9	7
55- 59.9	17
50- 54.9	15
45- 49.9	8
40- 44.9	9
35- 39.9	4
30- 34.9	8
25- 29.9	5
20- 24.9	3
Total	175
Mean	69.01
S.D.	24.935

The arrays on pages 49 and 50 were used in making the scale on page 48 for transmuting of raw test scores into sigma test scores so that the two mental test scores, Army Alpha and K.S.T.C. Entrance, would be directly comparable and might be added.